

## ABSTRACT

Disclosed is a heat-resistant diamond composite sintered body, which is prepared by sintering an ultrafine-grain synthetic diamond powder having an average grain size of 200 nm or less, without using a sintering aid. The composite sintered body comprises a diamond crystal and a minute amount of non-diamond carbon as a product, and has a Vickers hardness of 85 GPa or more. The composite sintered body is produced by a method comprising enclosing in a Ta or Mo capsule a synthetic diamond powder having an average grain size of 200 nm or less, and heating and pressurizing using an ultrahigh-pressure synthesizing apparatus under thermodynamically stable conditions including a temperature of 2100°C or more and a pressure of 7.7 GPa or more.